end of Chapter 5 there is an additional bibliography of papers on measure theory.

Eberhard Gerlach (Vancouver, B.C.)

Mathematical methods, Vol. 1 (Linear algebra/ Normed spaces/ Distributions/ Integration), by Jacob Korevaar. Academic Press, New York, and London, 1968. xii + 505 pages. U.S. $14.

The volumes on mathematical methods, of which the first is being discussed here, grew out of an intensive beginning graduate course for students in the physical sciences and applied mathematics which the author has taught for many years. We quote the beginning of the preface:

"The volumes on mathematical methods are intended for students in the physical sciences, for mathematics students with an interest in applications, and for mathematically oriented engineering students. It has been the author's aim to provide

(1) many of the advanced mathematical tools used in applications;

(2) a certain theoretical mathematical background that will make most parts of modern mathematical analysis accessible to the student of physical science, and that will make it easier for him to keep up with future mathematical developments in his field."

In the present volume, the author has certainly achieved these aims extremely well. From a mathematical point of view the presentation is fairly rigorous, but certainly not abstract. The book as a whole is very well organised. Each chapter, and again each section, is preceded by some introductory and descriptive paragraph(s). Every section is broken up into titled subsections - a very useful arrangement in the present book. At the end of each section there is a generous supply of substantial and well-chosen exercises. Every chapter has its own, very detailed, bibliography. The book should be eminently suitable as a text, and it will make a very good reference book for any student who has worked through it. The exposition and writing are indeed lucid. The reviewer has not found a single "dull" or "dry" passage in the whole book.

The principal prerequisites for this text are: a year of advanced calculus; in addition, some knowledge of elementary linear algebra and elementary differential equations would be desirable. The "introductory and relatively general" (author's description) material of the first volume is to prepare the student for such subjects as orthogonal series, linear operators in Hilbert Space, integral equations. (All but the last topic are to be the subject of the second volume.) Let us have a detailed look at the contents of the present volume.

Chapter One deals with relevant topics in linear algebra. The emphasis is on an understanding of the basic concepts of vector space and linear transformation. The treatment is largely coordinate-free so that it applies to infinite dimensional as well as finite dimensional situations. Topics are: Basic material on vector spaces, linear transformations, and linear functionals; matrices and determinants; systems of linear equations; eigenvalues problems, eigenvectors and generalized eigenvectors (= root vectors); Cayley-Hamilton Theorem, Jordan canonical form, etc.; algebraic theory of tensors.

Chapter Two provides an introduction to functional analysis. It begins with a detailed discussion of the many different kinds of convergence for sequences (and families) of functions which occur in practice. A basic theme, namely completion, is applied to a number of function spaces; e.g. it is shown how the Lebesgue integrable functions may be obtained by completion of a space of step functions. Another application of the method of completion leads to the distributions or generalized functions. Distributions are discussed from the beginning both as (generalized) limits of fundamental sequences of functions and as continuous linear functionals. This method had not been published before; it combines the original approach of S. L. Sobolev and L. Schwartz with those of the more intuitive elementary theories developed by the author and others. Delta sequences, or fundamental sequences belonging to the delta distribution, provide a unifying theme for a large class of theorems on convergence and approximation. Topics: Various kinds of convergence; metric spaces and normed vector spaces; completeness and completion; the Banach spaces L, L^p, $\mathbb{C}$; continuous linear functionals; distributions (two sections); delta sequences and convergence and approximation; spanning sets and Schauder bases.

Chapter Three deals with integration theory. The properties of Lebesgue integrable functions are developed further. Emphasis is on how to operate with Lebesgue integrals, and thus on theorems dealing with termwise integration, inversion in the order of integration, differentiation under the integral sign, and change of variables. Stieltjes integrals are introduced for the discussion of line integrals. Among the applications is a fairly general form of Green's Theorem in the plane not found in other books, which leads directly to the general form of Cauchy's Theorem for line integrals in the complex domain. "The brief and to some extent original sketch of complex analysis at the end of the chapter will be sufficient for the applications in Volume 2." Topics: Definition of the Lebesgue integral; approximation of integrable functions and applications (among the latter: Riemann-Lebesgue Theorem, improper Lebesgue integrals); integration of sequences and series; Lebesgue measure; functions of bounded variation and the Stieltjes integral; "rules based on the use of indefinite integrals" (indefinite Lebesgue integrals, absolute continuity, fundamental theorem of calculus, etc.); multiple integrals; curves and line integrals; holomorphic functions and integrals in the complex plane.

The reviewer can only recommend this book very highly: as a text in formal courses, as a source of reference for students and workers in the physical sciences or engineering, and for reviewing purposes for anyone interested in "applied mathematics". He is eagerly awaiting publication of Volume 2.

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Wahrscheinlichkeitstheorie und Grundzüge der Maβtheorie, by Heinz Bauer. Walter de Gruyter and Co., Berlin, 1968. 342 pages. DM 32.

This is an introductory but fairly high-level text on measure and probability theory. The two subjects of the book are well-balanced although not all of the material on measures is actually needed in the sections on probability.

The first part, on integration theory, treats measures as set functions in spaces without a topology, and leads up to the product of finitely many measures. It is followed by the basic concepts of probability theory including independence and various laws of large numbers. Next, measures in topological spaces are dealt with in some detail by the Daniell-Stone approach including weak convergence of measures. Here, the underlying spaces are mostly assumed to be Polish or, as in the treatment of compact sets of measures, locally compact with a countable base. After a chapter on Fourier analysis in finite-dimensional euclidean spaces, probability theory proper is taken up again: the Central Limit Theorem and related